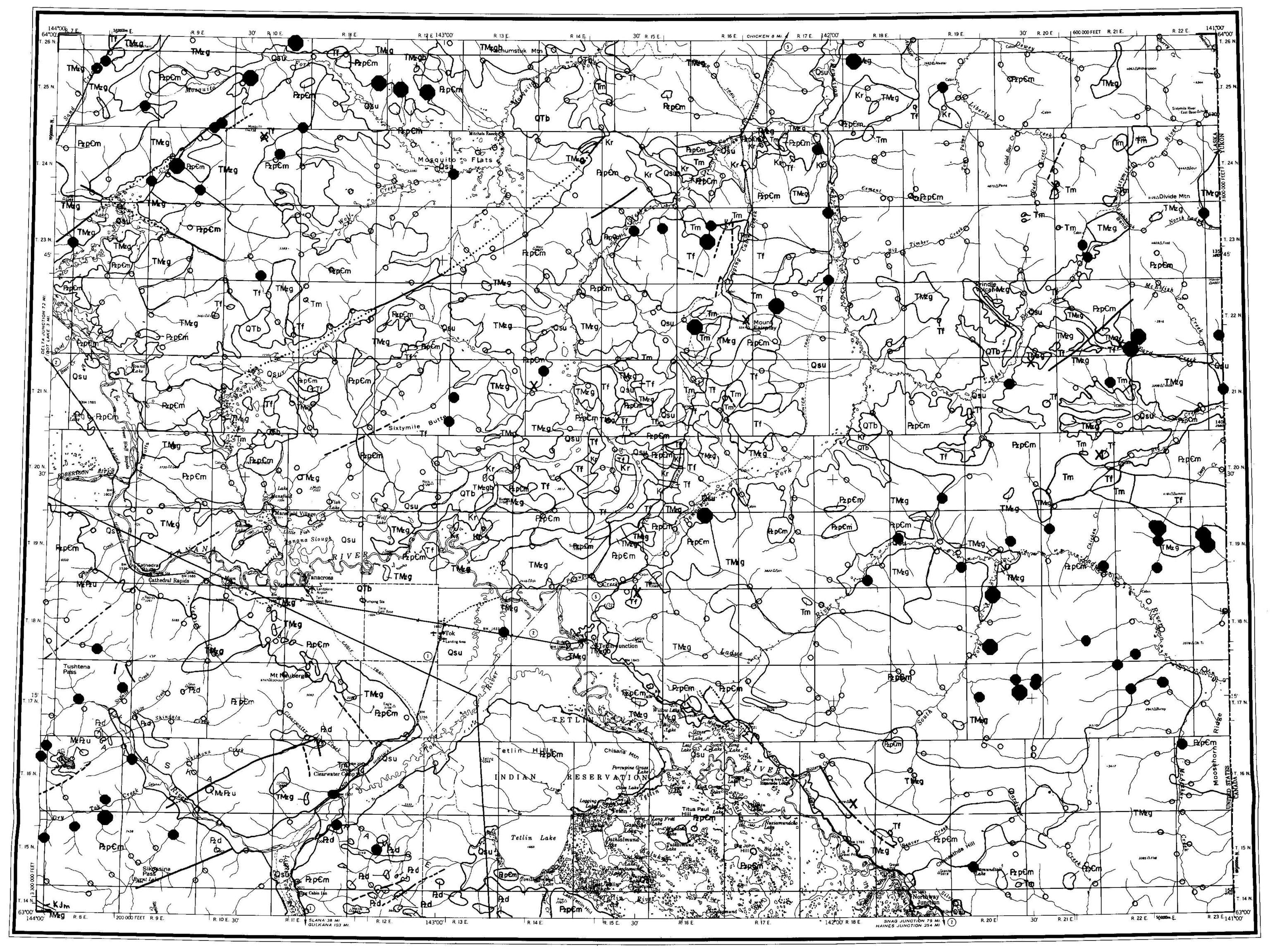
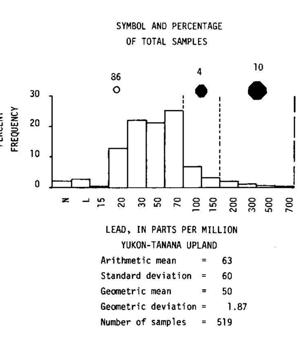
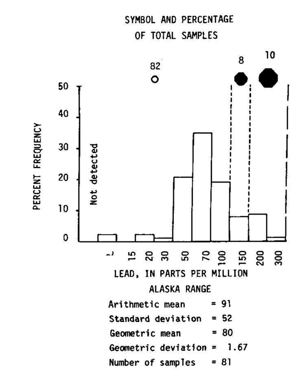
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

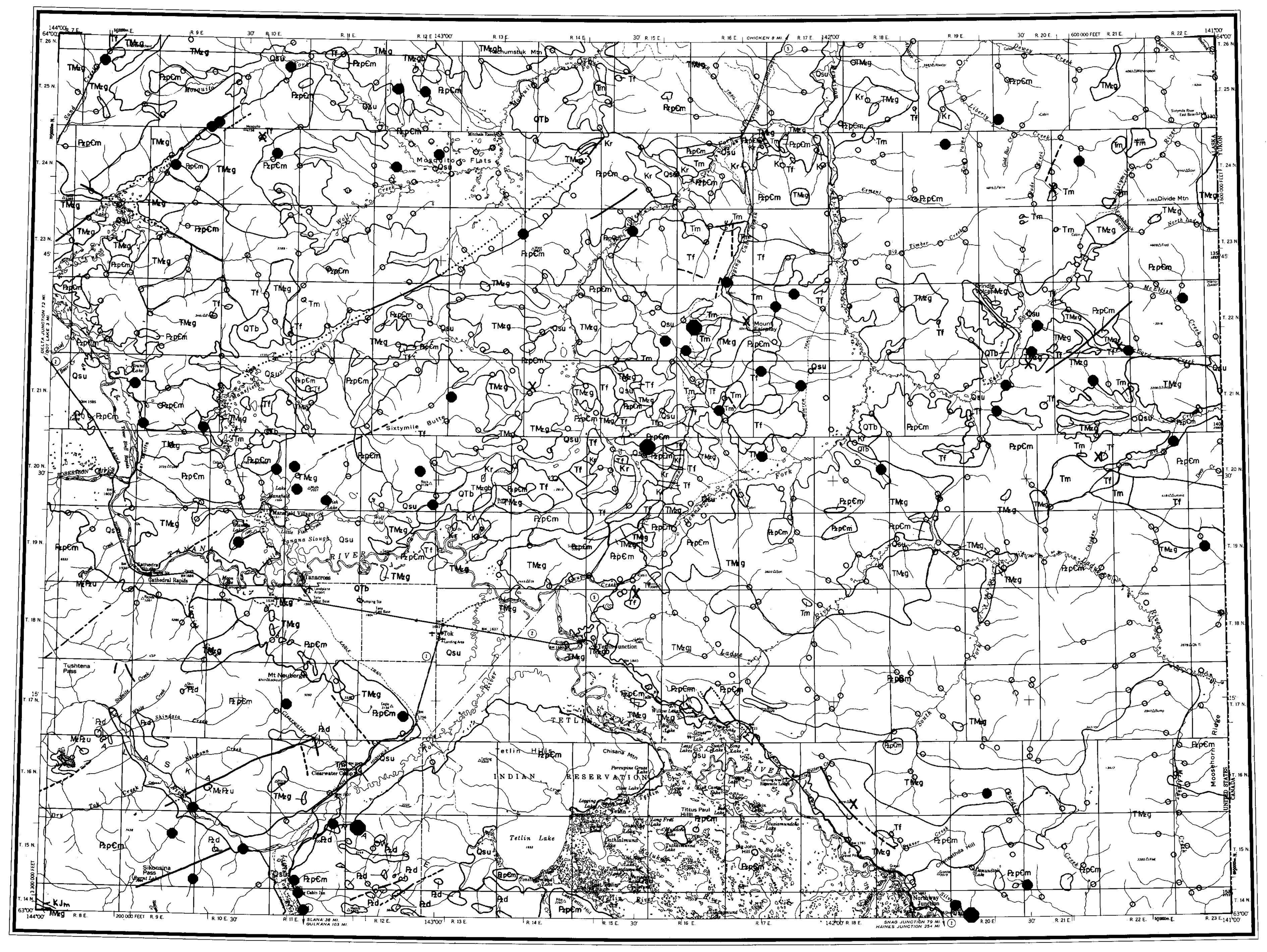
FOLIO OF THE TANACROSS QUADRANGLE, ALASKA
MAP MF-767H
CURTIN AND OTHERS--GEOCHEMICAL MAP, LEAD

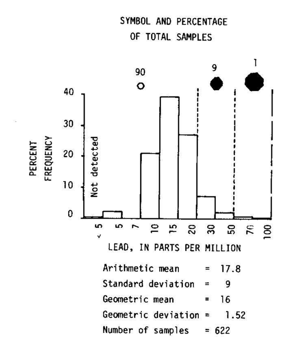




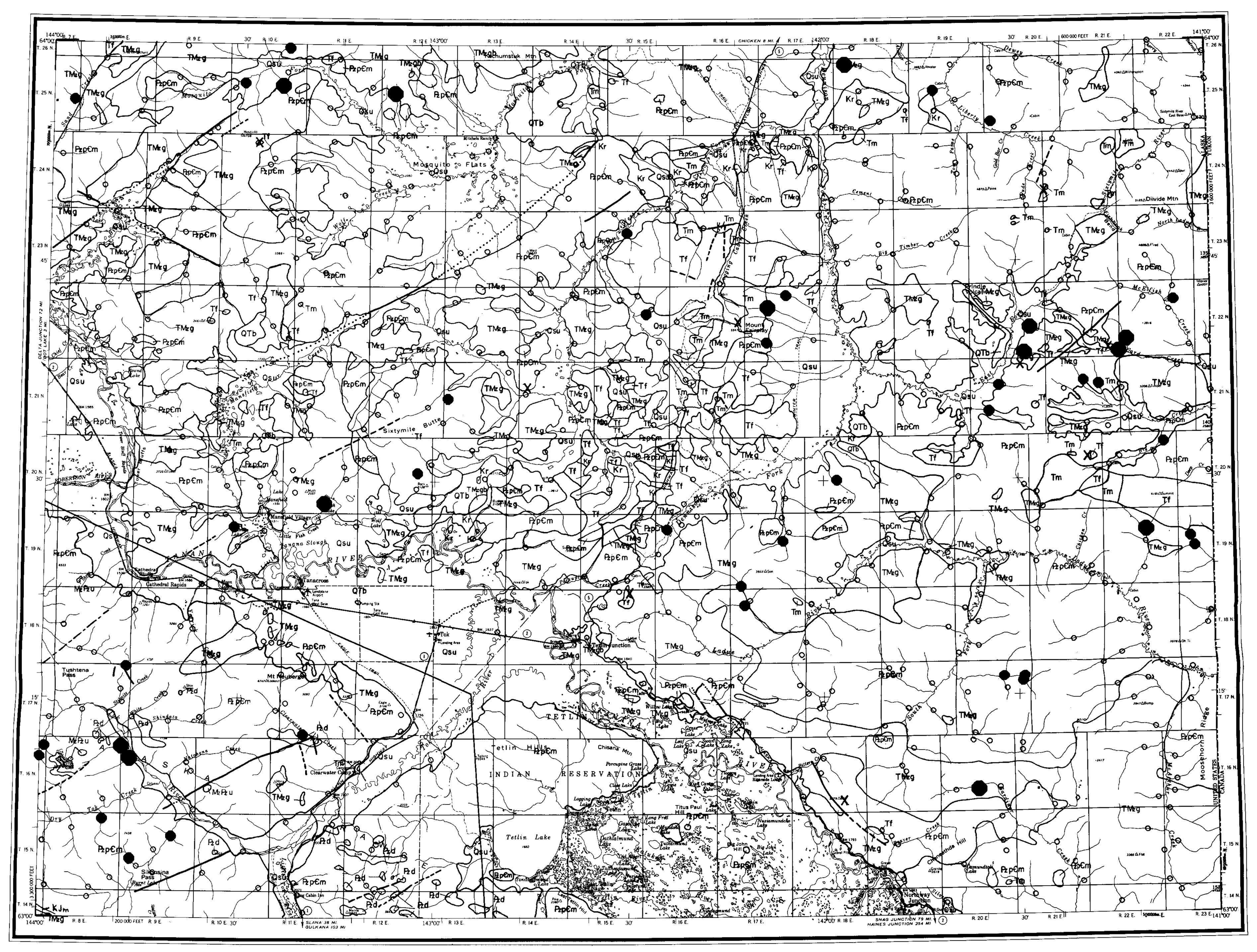


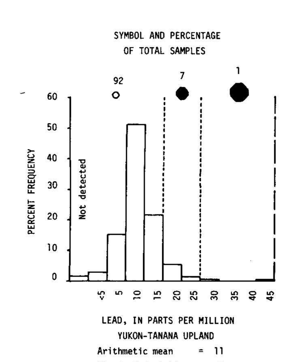
A. Lead in the oxide residue of stream sediment

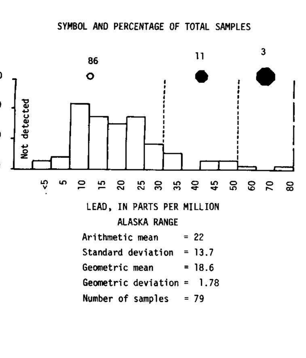




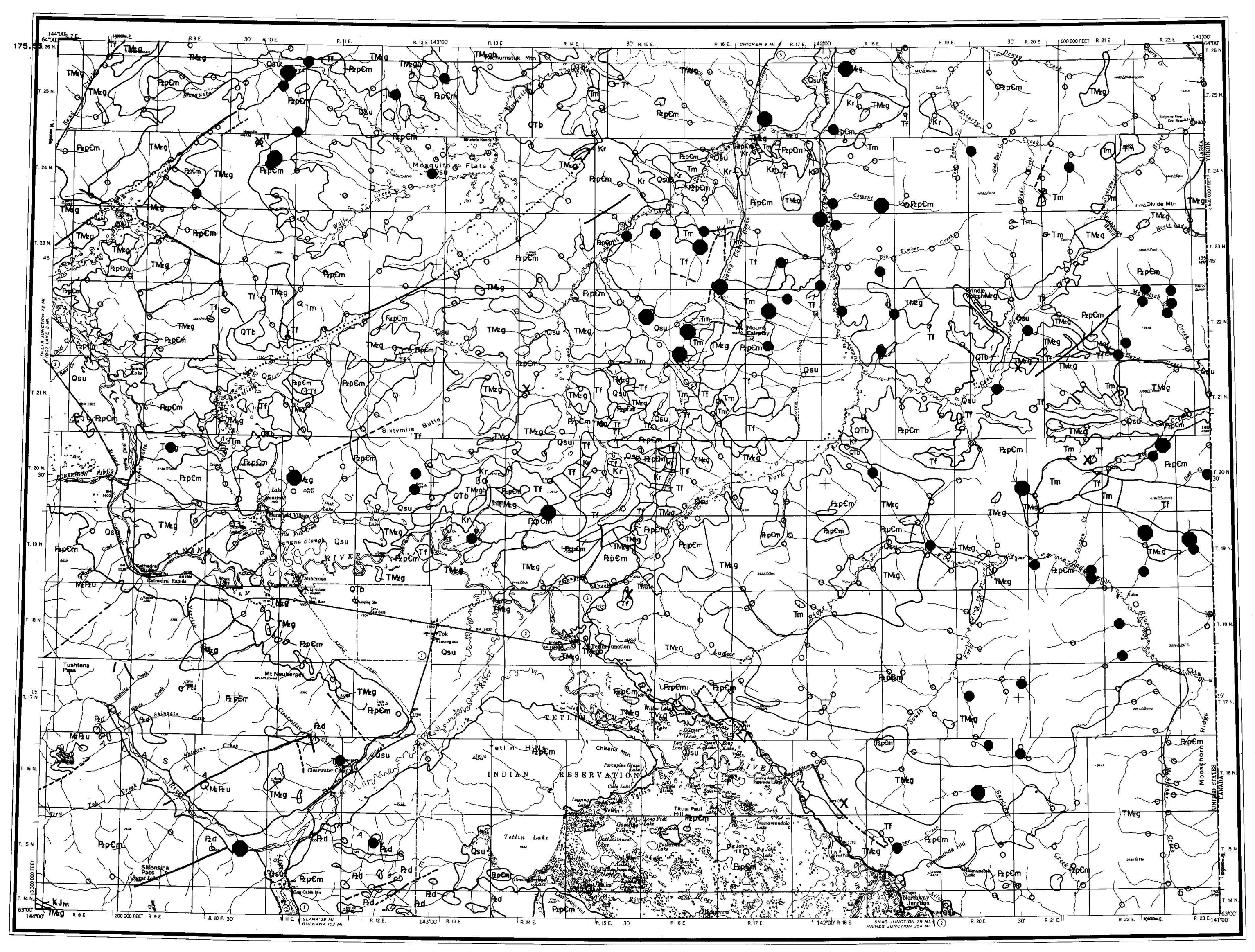
C. Lead in the ash of streambank sod

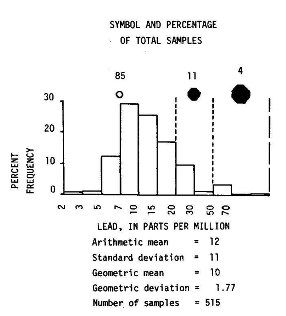






B. Lead in the minus-80-mesh stream sediment





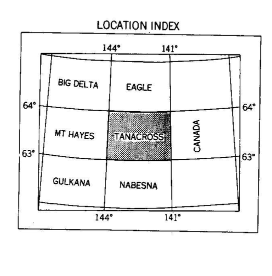
D. Lead in the ash of aquatic bryophytes (mosses)

BASE FROM U. S. GEOLOGICAL SURVEY, 1:250,000, TANACROSS QUADRANGLE, 1964

Scale 1:500,000
1 inch equals approximately 8 miles

10 0 10 20 30 40 Miles
10 0 10 20 30 40 50 Kilometers

QUADRANGLE LOCATION



GEOCHEMICAL MAPS SHOWING THE DISTRIBUTION AND ABUNDANCE OF LEAD IN THE TANACROSS QUADRANGLE, ALASKA

BY

G. C. CURTIN, G. W. DAY, R. M. O'LEARY, S. P. MARSH, AND R. B. TRIPP

1976

EXPLANATION

GEOLOGY GENERALIZED FROM FOSTER (1970)

CORRELATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — QUATERNARY

SEDIMENTARY ROCKS

Kr — CRETACEOUS(?)

KJm — CRETACEOUS OR JURASSIC

IGNEOUS AND METAMORPHIC ROCKS

QTb — QUATERNARY AND TERTIARY

Tm, Tf — TERTIARY(?)

TMzg, TMzgb — TERTIARY OR MESOZOIC

MzPzu — MESOZOIC OR PALEOZOIC

Pzd — PALEOZOIC(?)

PzpЄm — PALEOZOIC AND (OR) PRECAMBRIAN

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — UNCONSOLIDATED SEDIMENTARY DEPOSITS

SEDIMENTARY ROCKS

Kr — DETRITAL ROCKS (CRETACEOUS?)

KJm — MENTASTA ARGILLITE OF RICHTER (1967) (JURASSIC OR CRETACEOUS)

IGNEOUS AND METAMORPHIC ROCKS

QTb — BASALT

Tm — MAFIC VOLCANIC ROCKS

Tf — FELSIC TUFF, WELDED TUFF, LAVA, AND HYPABYSSAL INTRUSIVE ROCKS

TMzg — GRANITIC ROCKS, UNDIVIDED

TMzgb — GABBRO

MzPzu — ULTRAMAFIC ROCKS

Pzd — DIORITE

PzpЄm — METAMORPHIC ROCKS, UNDIVIDED

GEOLOGIC SYMBOLS

CONTACT, APPROXIMATELY LOCATED

FAULT, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED. U, UPTHROWN SIDE; D, DOWNTHROWN SIDE

FAULT OR LINEAMENT FROM AERIAL PHOTOGRAPHS

LINE SEPARATES NORTHERN (YUKON-TANANA UPLAND) POPULATION OF GEOCHEMICAL SAMPLES FROM SOUTHERN (ALASKA RANGE) POPULATION

X BASE METAL PROSPECTS NORTH OF THE TANANA RIVER

GEOCHEMICAL SYMBOLS

○ BACKGROUND VALUES

WEAKLY ANOMALOUS VALUES

STRONGLY ANOMALOUS VALUES

DISCUSSION

This series of geochemical maps shows the distribution of lead in four sample media: (A) the oxide residue (oxalic-acid-leachable fraction) of the stream sediment, (B) the minus-80-mesh stream sediment, (C) the ash of streambank sod (mixed organic and inorganic material) collected beneath the water level, and (D) the ash of aquatic bryophytes (mosses). The geochemical data are plotted on a base map that shows generalized geology and the drainage pattern. The map symbols show sample sites and ranges of values in the following manner: (1) open symbols denote background, (2) small black symbols represent weakly anomalous values, and (3) large black symbols denote strongly anomalous values. Because the small black symbols represent weakly anomalous values, they are considered to be significant only where they are closely associated with strongly anomalous metal values either in the same medium or with anomalous values in other sample media. The ranges of values represented by the symbols are shown on histograms that accompany the geochemical maps. An explanation of sampling, preparation, and analytical procedures is given in Circular 734, which accompanies this folio. Complete analytical data for geochemical samples collected by the U.S. Geological Survey in the Tanacross quadrangle are available in a U.S. Geological Survey open-file report (O'Leary and others, 1976).

The influence of the organic content on the variation of lead in the sod was judged to be too small to warrant adjusting the lead values using regression analysis. Therefore, the unaltered lead values in sod ash are shown on figure C and in the accompanying histogram.

The histograms and other statistical data for lead in the oxide residue of stream sediment (fig. A) and in the minus-80-mesh stream sediment (fig. B) show two populations. For each sample medium, one population (generally lower values) represents the lead content of the samples collected in the maturely dissected, forested terrain of the Yukon-Tanana Upland--that part of the quadrangle north of the Tanana River. The other population (generally higher lead values) represents samples collected in the rugged, mountainous terrain of the Alaska Range--south and west of the heavy black line on the map. In the maturely dissected terrain, chemical weathering is probably the main factor controlling the mobility of lead. This type of weathering results in the solution of unstable minerals such as sulfides and a general dispersion of impoverishment of lead and other base metals in the weathering zone. In the rugged, mountainous terrain, on the other hand, mechanical weathering is the primary process controlling element dispersion. In this environment, impoverishment of metals in the weathering zone due to chemical processes is a minor factor.

The distribution of lead in the four sample media reveals five areas of anomalously high lead values in the maturely dissected terrain north of the Tanana River.

In the northwest part of the quadrangle, an area of lead potential is suggested by anomalous lead values in the oxide residue of the stream sediment (fig. A). This area is also shown, to a lesser extent, by scattered anomalous and weakly anomalous lead values in the other three sample media. High lead values in the oxide residue of the stream sediment, and in the ash of streambank sod and moss, delineate a mineralized zone that is exposed on the ridge west of Mosquito Flats (T. 24 N., R. 10 E.). Samples from this zone also contain anomalous amounts of molybdenum, and the surrounding rocks contain anomalous amounts of lead, copper, tin, and silver (H. L. Foster, oral commun., 1975). Other high lead values in this part of the quadrangle may reflect the presence of additional mineralized zones.

An anomalous area near the center of the quadrangle is indicated by scattered high lead values in all four sample media. The area is better defined by high lead values in the ash of streambank sod and aquatic bryophytes, however, than by the lead values in the oxalic-acid-leach fraction or the minus-80-mesh fraction of the stream sediment. Altered and mineralized rock has been prospected at several localities in this area. Anomalous copper, molybdenum, and zinc values correlate, in part, with the high lead values (Curtin and others, 1976a, b; Curtin, Day, Carten, Marsh, and Tripp, 1976). These anomalous metal values are associated with a sharp magnetic high that is similar to highs that correlate with known mineral occurrences at other localities in the quadrangle. This association suggests a favorable environment for mineralization in this part of the quadrangle.

A third anomalous area is delineated by high lead values in all four sample media in the east-central part of the quadrangle--in T. 21-22 N., R. 20-22 E. The lead is most likely associated with several porphyry copper-type zones that have been prospected in this area. An anomalous area to the south is indicated by scattered high lead values in the oxide residue of the stream sediment (fig. A) and in the ash of aquatic bryophytes (fig. D). These high lead values suggest additional localities where lead is migrating in solution from mineralized bedrock and is being scavenged by aquatic bryophytes and by secondary iron-manganese oxides in the stream sediment.

A fifth anomalous area is in the west-central part of the quadrangle where scattered, anomalous lead values in sod and moss ash (figs. C and D), and in the minus-80-mesh stream sediment (fig. B) suggest another area of possible lead mineralization. The presence of mineralized rock in this area is further substantiated by the correlation of high lead values with high molybdenum, zinc, and arsenic values shown on maps 767-G, 767-I, and 767-J of this folio (Curtin, Day, Carten, Marsh, and Tripp, 1976; Curtin and others, 1976b; Curtin, O'Leary, and Carten, 1976).

Four base metal prospects in that part of the quadrangle north of the Tanana River are not defined by high lead values in any of the four sample media. These prospects are located in T. 21 N., R. 14 E.; T. 18 N., R 15 E.; T. 16 N., R. 18 E.; and in T. 20 N., R. 21 E. The absence of anomalous lead values around the prospects indicates either that the lead content of the altered and mineralized rock is low or that the amount of mineralized rock is too small to produce lead-bearing dispersion trains that could be detected at the sampling density used in this study.

High lead values in the Alaska Range in the southwest part of the quadrangle (figs. A and B) probably reflect the presence of lead in small, mineralized shear zones and veins that are known to occur in this terrain.

The results of the geochemical sampling demonstrate that lead occurrences are more completely defined by the use of a combination of sample media than by any one of the media when used alone.

Patterns defining areas of lead potential are shown on the composite geochemical map of lead and zinc distribution (Curtin, Day, O'Leary, Tripp, and Carten, 1976), which is included in this folio.

REFERENCES CITED

Curtin, G. C., Day, G. W., Carten, R. B., Marsh, S. P., and Tripp, R. B., 1976, Geochemical maps showing the distribution and abundance of molybdenum in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767G, 1 sheet, scale 1:500,000.

Curtin, G. C., Day, G. W., O'Leary, R. M., Marsh, S. P., and Tripp, R. B., 1976a, Geochemical maps showing the distribution and abundance of copper in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767F, 1 sheet, scale 1:500,000.

_____1976b, Geochemical maps showing the distribution and abundance of zinc in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767I, 1 sheet, scale 1:500,000.

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Curtin, G. C., O'Leary, R. M., and Carten, R. B., 1976, Geochemical maps showing the distribution and abundance of arsenic and mercury in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767J, 1 sheet, scale 1:500,000.

Foster, H. L., 1970, Reconnaissance geologic map of the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-593, scale 1:250,000.

O'Leary, R. M., McDanal, S. K., McDougal, C. M., Day, G. W., Curtin, G. C., and Foster, H. L., 1976, Spectrographic and chemical analyses of geochemical samples and related data from the Tanacross quadrangle, Alaska: U.S. Geol. Survey open-file rept. 76-422, 94 p.

BACKGROUND INFORMATION RELATING TO THIS MAP IS PUBLISHED AS U.S. GEOLOGICAL SURVEY CIRCULAR 734, AVAILABLE FREE OF CHARGE FROM THE U.S. GEOLOGICAL SURVEY, RESTON, VA. 22092

For sale by U. S. Geological Survey, price $.50